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AUTHOR Yeargan, Dollye R.
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ABSTRACT

The factorial structure of intellectual functioning and adaptive behavior was examined in 160 learning disabled students (6 to 16 years old). Ss were administered the Wechsler Intelligence Scale for Children-Revised (WISC-R) and the Coping Inventory (CI). Factor analysis of WISC-R scores revealed three factors: verbal comprehenson, perceptual organization, and freedom from distractibility. Factor analysis of the CI scores revealed only one factor. Correlation analysis of scaled scores from both tests revealed no significant amount of relationship. Findings suggested that for this population, intellectual functioning (as measured by the WISC-R) and adaptive behavior (as measured by the CI) are not significantly interrelated. Possible explanations for lack of relatedness between the two measures include differences between norm referenced and criterion referenced tests. Implications for use of norm or criterion referenced measures are made. (CL)

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A FACTOR-ANALYTIC STUDY OF ADAPTIVE BEHAVIOR AND INTELLECTUAL FUNCTIONING IN LEARNING DISABLED CHILDREN

Dollye R. Yeargan, Ph.D.
Associate School Psychologist
Cooke County Special Education Cooperative
Gainesville, TX. 76240
February, 1983

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INTRODUCTION

In the past, school children referred for psychological evaluation were administered test batteries comprised of instruments designed to measure psychometric and edumetric status (4). With the passage of PL 94-142 (Education Act for All Handicapped Children, 1975), the assessment of adaptive behavior was mandated to ensure nonbiased pupil appraisal. Currently, federal, state, and local education agencies include the assessment of adaptive behavior as an important part of the evaluation and educational programming of all children being considered for special education services.

Adaptive behavior, both as a concept and as an integral though complex part of intellectual functioning, needs to be understood by those charged with its assessment. One of the reasons that adaptive behavior has been difficult to assess is that professionals with different areas of expertise have conceived of it in ways circumscribed by their particular fields of interest. Consequently, their definitions of adaptive behavior tend to reflect this. There are at least two different approaches to the concept of adaptive behavior in current usage. The first evolved from a movement on the part of the public to promote the idea of least restriction, i.e., each handicapped person should be afforded training in adaptive skills so that he may function as near the social norm as possible. The other approach is illustrated by efforts

to ensure equal treatment for all children in public schools by the adoption of nonbiased assessment procedures. Seen from the latter viewpoint, the measurement of adaptive behavior emphasizes the extent to which a child can cope with the social and cultural environments outside the school. Both of these concepts are treated by the same federal mandate, PL 94-142. The law which requires nonbiased assessment for minority group children also requires the development of procedures for the least restrictive educational placement and for optimum training for mentally handicapped students.

An idea of the complexity involved in the assessment of adaptive behavior can be derived from an examination of some of the ways different theorists define adaptive behavior. Mercer (21, p.13) emphasizes the social aspect of adaptive behavior. She sees adaptive behavior as "an individual's ability to play ever more complex social roles in a progressively widening circle of social systems." Nihira (24, p.215) implies that adaptive behavior is a wide-ranging concept applicable to the diagnosis of disabilities. He calls it "a composite of many aspects of behavior and a function of a wide range of specific abilities and disabilities." Robinson and Robinson combine the concept of fit to environmental demand with varying tasks during the developmental sequence.

> Impairment in adaptive behavior . . . may be reflected during infancy and early childhood mainly by impairment in maturation manifested by retarded development in sensory motor behavior, self-help skills, and language. During the school years, the predominant area of impairment is in learning the skills that are of special importance in the academic setting (30, pp.615-616).

Leland, et al. (19, p.11), emphasize the fit of the individual to environmental demands. Simplified, their definition states that the " . . . ability to adapt to environmental demand (is) represented by three behavioral formations: (1) Independent functioning, ... (2) Personal responsibility, ... (3) Social responsiblity, ..." Leland (18, p.25) also points out the very obvious relationship between adaptive behavior and intelligence. Individuals with higher levels of intellectual functioning learn to perform skills sooner, are able to assume greater personal responsibility, and have a high capacity for social adjustment. Zeitlin (34, p.12) defines adaptive behavior in terms of the coping mechanisms a child employs to meet his own needs and to adjust to the demands of his environment.

Although the assessment of adaptive behavior has been mandated in making decisions regarding the designation of a child as mentally retarded, the issue of adaptive behavior assessment in other groups of children referred for evaluation has been left up to the discretion of the professional involved. Yet, if a child's behavior patterns are affecting his achievement, this problem needs to be addressed.

It is widely acknowledged that children with learning disabilities commonly show emotional and behavioral problems as well as difficulties in attention, perception, cognition, and school achievement (8, p. 163). In a study which examined the behavior of a group of learning disabled (LD) children, Cullian, et al. (8), found that LD boys and girls showed significantly greater maladjustment than normal boys and girls.

Other researchers (27) found that the behavior problems of LD pupils were factorially summarized by three dimensions: Conduct Disorder, Personality Problem, and Inadequacy--Immaturity. Cullen, et al. (7, p.288), point out that affective variables have potential for suppressing the effects of remedial assistance at the verbal-cognitive level and that this suppression effect can be accentuated if its impact on school learning is not acknowledged in the development of remedial strategies. Lambert and Urbanski (16, p. 59)concluded from their studies of the behavioral profiles of children with different levels of achievement that there are three basic dimensions underlying children's behavior. They defined them as (a) adaptation, a learning problems dimension; (b) interpersonal, a social interaction dimension; and (c) intrapersonal, a personal adjustment dimension.

Coulter and Morrow (6, p. 105) concluded on the basis of results obtained from a state-wide survey of appraisal personnel in Texas' public schools that misunderstanding of the concept of adaptive behavior was widespread among practitioners. Reportedly, practitioners tended to measure student adaptation within the academic setting rather than outside of it; e.g., in the home or the larger community. Coulter and Morrow state that it is the assessment of behavior which occurs outside the school which underlies the entire concept of the measurement of adaptive behavior. Most practitioners know this concept and readily interpret it whenever a designation of mental retardation is the concern of the referral. In most cases, however, mental retardation is not the major concern. Adaptive behavior in the schoolroom is. Consequently, in responding to the Coulter and Morrow

survey, practitioners may have been reflecting a need for more systematic ways of assessing adaptive/maladaptive behaviors in an academic setting.

Unfortunately, as Richmond and Horn (29, p. 159) point out, the need to assess adaptive behavior has not been accompanied by the instruments necessary to accomplish that task. Each test presently used to assess adaptive behavior has been researched to some extent and found lacking (2, 11, 25, 26, 29). The Vineland Social Maturity Scale (9), as a venerable tool for the assessment of social competence, is currently being updated and revised and will be available soon. The sample on which the Vineland was originally normed was very restricted (31, p. 435). Although the avowed purpose of the AAMD Adaptive Behavior Scale - Public School Version (17) (ABS-PS) is to aid in placement and program planning decisions in the public schools, the reliability and validity of the scale are not adequate for these purposes (31, p. 443). The Adaptive Behavior Inventory for Children (22) (ABIC) has been criticized because the use of a single scale and single set of norms for all children violates the pluralistic principles of Mercer's SOMPA. In addition, since the sole informant of the child's adaptation is the mother, the ABIC may be more of a test of parental perception than of the child's role behavior (11, p. 54). The ABIC has also been criticized by some of its users and reviewers because it appears to be an attempt to keep children out of special education. It provides little framework for suggesting the kind of educational programming a child in

academic difficulty may need (25, 26, 29). The ABIC also necessitates a lengthy home visit and this is just not practical or possible for most school districts to provide.

Since adaptive behavior has been generally defined as effectiveness in coping with the natural and social demands of the environment (2, p. 260), it is felt that the Coping Inventory (34) (CI), which was specifically designed to measure these constructs, would be a welcome addition to the options open to practitioners who wish to assess adaptive behavior. In addition, it was also designed to be useful in planning educational programs to enhance a child's adaptive skills.

Since both intellectual functioning and adaptive behavior must be assessed before placement into special education programs, their relationship has meaning in this regard. For example, Bailey and Richmond (2, p. 260) report that the AAMD ABS-PS correlates highly with measures of intelligence (.75) and stress that its use in the placement process is questionable because of this. For this reason, it was felt that a study investigating the relationship between intellectual functioning, as measured by the Wechsler Intelligence Scale for Children - Revised (33) (WISC-R), and adaptive behavior, as measured by the CI, would aid in the diagnostic use of both of these instruments.*

*Although the original research on which this paper is based included an extensive review of the literature on the use of pattern analysis in the identification and classification of LD children using the WISC-R, only that research pertaining to the relationship of the WISC-R to the CI is reported here.

METHOD

Population and Sample

Permission for this study was obtained from the Director of the Cooke County Special Education Cooperative and the author of the CI. Anonymity and confidentiality of collected data were guaranteed and research was carried out in accordance with the ethical guidelines established by the American Psychological Association (1).

The Cooke County Special Education Cooperative serves special education students in six independent school districts in this North Central Texas county. Total population in Cooke County was reported to be 23,471 in 1981-1982. This area includes one small town, several farm communities, and a large rural area. The population of rural areas is largely of whites. There are two communities of predominantly German heritage. Racial composition of the town is about ninety per cent white, seven per cent black, two per cent Hispanic, and one per cent other. Rural areas are a mixture of agriculture, ranching, gas and oil production, and one private lake development. The town is also the county seat and is supported largely by a single large oil well supply manufacturing and assembly plant. The county has ten elementary schools, two middle schools, and six high schools.

Subjects

Each school in the Cooke County Special Education Cooperative contributed subjects for this study. All students de-

signated LD and receiving instruction in a resource room for a part of each day and who were in the WISC-R age range during the fall semester of 1981-82 were included in the sample. Only those students whose intellectual functioning was assessed with some other test were not included.

The sample consisted of 48 girls and 112 boys. The children ranged in age from six years, three months to sixteen years, two months, with a median age of nine years, five months. Racial composition of this group was eighty-eight per cent white, eleven per cent black, and one per cent Hispanic. WISC-R full scale IQ scores ranged from 76 to 118. All subjects in the sample were administered the WISC-R (exclusive of the Mazes subtest) by the same examiner who routinely tests for a variety of purposes in addition to identification of learning disabilities.

Procedure for Collection of Data

Each child was rated by his/her resource teacher during the first semester of the 1981-1982 school year. Teachers were instructed in standard procedures for rating students as specified by Zeitlin (34, p. 24). The inventories were collected, scored, and data were tabulated for analysis.

Individual subtest scores from the WISC-R were also tabulated for analysis. All subjects had been determined by a multidisciplinary assessment team to be functioning within normal limits intellectually, to have marked academic delays in the absence of sensory impairment, serious emotional disturbance, mental retardation, or brain damage.

Procedure for Analysis of Data

Separate factor analyses were conducted as follows:

1. A zero-order correlation matrix was computed from the 11 WISC-R scaled scores of each LD student and this was subjected to a principal-factors solution with communalities determined by iteration. Factors from this analysis with eigenvalues greater than 1.0 were rotated orthogonally with a criterion of simple structure according to Kaiser's (14) varimax procedures.

2. The same procedure described in 1. was followed, using the six discrete CI scores for the LD students, for the correlation matrix.

3. A third analysis utilizing the canonical correlation model (5, pp. 168-197) for factoring two batteries simultaneously was carried out using the 11 WISC-R scaled scores and the six CI scores to extract factors which, though uncorrelated within batteries, would provide maximum correlations of pairs of factors across these two batteries. Any resulting canonical correlations were to be tested for significance using standard procedures as outlined by Cooley and Lohnes (5, p. 175).

4. Additional statistical treatment was to be developed contingent on the results of 1. through 3., above.

RESULTS

Presentation of Data

When WISC-R subtest scores for this population of 160 LD children were subjected to principal-factor analysis and resulting factors rotated to varimax criterion, individual loadings

were considered significant if they were ≥ .30. Results of this analysis are shown in Table I in the Appendix. The three factors which emerged for this population corresponded to those labeled by Kaufman (15, p.21) as Verbal Comprehension (I), Perceptual Organization (II), and Freedom from Distractibility (III).

The results of a principal factor analysis of the CI for this population are shown in Table II in the Appendix. Since only one factor emerged, further rotation would have been pointless. These results indicate that for this population the CI is a one-factor test. This finding agrees with Zeitlin's analysis of CI scores for the non-handicapped group from her original field test study (34, p. 11), which also elicited a single, predominant factor. In the Zeitlin analysis of non-handicapped children, the predominant factor extracted accounted for 62.2 per cent of the variance. The factor extracted in the present study accounted for 76.6 per cent of the variance.

In the third analysis, scaled scores from both the WISC-R and CI were combined and subjected to canonical correlation analysis using the SSPS computer subprogram CANCORR (23, pp. 515-527). This subprogram automatically outputs (1) the canonical correlations, (2) results of tests of statistical significance for the correlations, and (3) the canonical variate coefficients. This analysis resulted in no canonical correlation which was significant at the .05 level. In other words, no significant amount of relationship was found between these two sets of variables. It can be determined that, at least for this population, intellectual functioning (as measured by

the WISC-R) and adaptive behavior (as measured by the CI) are not significantly interrelated.

In order to investigate the results of the canonical analysis further, the correlation matrix between these two sets of data was analyzed by principal factor analysis, with communalities estimated by iteration, and rotated to varimax criterion. Correlation coefficients are shown in Table III in the Appendix. Correlations below +.20 were omitted in the interest of clarity. Results of this analysis are shown in Table IV in the Appendix. The relative independence of the four factors obtained is readily apparent. Although there are some alterations of loadings among factors when these data are compared to the separate analyses of the WISC-R and CI, the same configuration is manifested. All the CI scales loaded heavily on Factor I. The verbal subtests of the WISC-R, with the exception of Digit Span, loaded on Factor II. This is consistent with interpretation of this factor as Verbal Comprehension. The performance subtests of the WISC-R, with the exception of Coding, loaded on Factor III. This is consistent with previous findings for a Perceptual Organization factor. In this analysis, the Similarities subtest also loaded on Factor III. The only subtests loading on Factor IV were Information and Digit Span. Arithmetic loaded positively on this factor, but not significantly. Thus, findings with regard to a Freedom from Distractibility factor, are not as clear as they were when these data were analyzed separately. It may be concluded, however, that adaptive behavior, as measured by the CI, and intellectual functioning, as measured by the WISC-R, are not measuring significantly related phenomena in this population.

Means and standard deviations for this population of LD children were output as a part of the SPSS FACTOR program (23) for the scaled scores from the WISC-R and CI. This information is included in Tables IV and V, respectively, in the Appendix.

DISCUSSION

It should be noted that the lack of relatedness between the two measures used in this study could be due to the basic and fundamental difference between norm-referenced and criterion-referenced tests. Emphasis is placed on the observation of a child in familiar surroundings for the CI, rather than on his verbal response to standardized questions. Wechsler has stated that intelligence is "the overall capacity of an individual to cope with the world around him . . ." (33, p. 5). Although this definition seems synonymous with previously-cited definitions of adaptive behavior, there is a great difference between how a child responds to a stranger in a clinical setting and how he responds and interacts with his peers in a familiar environment. It is possible that the lack of relatedness between these two constructs lies not in what is being evaluated, but in the conditions under which the evaluation occurs.

It can be seen, then, that the choice of testing devices for the measurement of adaptive behavior will have a significant bearing on whether or not it is related to intellectual ability. Adaptive behavior is sometimes assessed to demonstrate a significant difference between a particular child

and a norm group for classification and placement purposes. Such a test could be expected to be somewhat related to other measures normed by age and development. If, on the other hand, the purpose of assessing adaptive behavior is the planning of an educational program to improve social adaptation, the test would necessarily entail an evaluation of the child's interpersonal-intrapersonal coping behaviors. These two perspectives--the assessment of adaptive behavior by age-related norms or in terms of social and personal adjustment--appear to be critical to understanding the measurement of adaptive behavior.

Consequently, the purpose of assessing adaptive behavior is of paramount importance in the selection of an appropriate test. If the purpose is identification and/or classification to make placement decisions, a norm-referenced instrument would seem to be the best choice. The criteria for selection of such a test would be content validity (test items would need to be truly representative of a particular dimension of behavior), appropriate norms, and good reliability. If the purpose is educational program planning, a criterion-referenced test would be selected. Such a test would also be chosen for good content validity (test items would cover a particular dimension of behavior comprehensively), reliability would be judged by inter-rater agreement, and validity would be dependent on whether or not interventions and programs planned using information from test scores could be shown to

be effective. It has been noted by Reschley (28, p. 224) that most measures of adaptive behavior are useful for one or the other of these purposes, but not for both.

It is becoming more and more apparent that a lack of coping skills can disable a learner as surely as a lack of intellectual or academic skills. Teachers and counselors have begun to realize that increased competence in learning to deal with stress, conflicts, and aggression can open the way to the acquisition of a better education for their students. Many children need training in social skills before they can benefit from remedial educational experience. Although concerns are sometimes expressed about the tendencies for schools to encourage and perpetuate obedient, controlled, conforming behavior in classrooms, evidence from various sources indicates that such behaviors are correlated highly with academic achievement (3). The specific teaching of behaviors such as attending and interacting with the teacher have not only resulted in increased positive behavior from the teacher, but it appears that teaching these social skills will also increase academic learning (3, 151).

Many studies (3, 10, 12, 13, 20) of ways and means of teaching adaptive behaviors and social skills in the classroom are appearing in the literature. As emphasis continues to shift from explaining, classifying, or labeling of children to better educational planning so that a child can take advantage of educational opportunities, more research will

undoubtedly ensue. Duffey, et al. (10, p. 433), believe that the time may be fast approaching when questions of test bias and operational definitions of handicapping conditions for use in placement and programming decisions in the public schools will be obsolete concepts. Such imprecise diagnostic classifications as "mental retardation," "emotional disturbance," and "learning disabilities" may all be replaced by "learning objectives achieved." Skill development levels could be routinely assessed, not only with less bias, but with adequate levels of reliability. Assessment would then be based on the actual service provided by the schools: the teaching of a curriculum.

Until then, however, it is felt that use of the CI as an integral part of the assessment of children referred for evaluation would be a fundamental, first step in addressing behavioral changes the child may need to make in order that he may learn to learn. If educational goals are to be realized, social skills must be considered in the educational planning and programming for the LD child. The curriculum for the LD student should include experiences designed to develop appropriate coping behaviors essential for increased acceptance by both peers and teachers.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations are offered:

1. Local norms should be developed for the CI, because acceptable behavior differs from community to community.

2. When the CI is applied to minority students, caution should be used with the assessment of behaviors which the student may have had no opportunity to experience or learn. For example, Hispanic children may have been reinforced at home for passive response patterns and would tend to score more toward the passive than the active dimension on the CI.

3. More research needs to be carried out which addresses whether or not the CI clearly differentiates between those of normal intelligence and the mildly mentally retarded.

4. This study needs replication with a large sample of "average" students defined with respect to the various demographic variables to extend the norms presented in the test manual and to determine whether the CI's factor structure varies with regard to these variables.

APPENDIX

TABLE I

WISC-R VARIMAX ROTATED FACTOR LOADINGS*

Subtest	Factors I	II	III	h^2
Information	.5043	.1586	.2703	.3525
Similarities	.5184	.2906	.2385	.4101
Arithmetic	.2987	.0771	.5496	.3972
Vocabulary	.8286	.2074	.1224	.7446
Comprehension	.7480	.1078	.1860	.6058
Digit Span	.2666	.1336	.3454	.2082
Picture Completion	.1901	.5175	.0979	.3136
Picture Arrangement	.1971	.4706	.1402	.2800
Block Design	.0786	.7177	.1672	.5492
Object Assembly	.1047	.5979	.1239	.3838
Coding	.0547	.1860	.3885	.1885
%Variance	71.5	20.7	7.8	
Cumulative Var.	71.5	92.2	100.0	

*Significant loadings (≥ .30) are underlined.

TABLE II

COPING INVENTORY FACTOR MATRIX
PRINCIPAL FACTOR ANALYSIS
WITH ITERATIONS

Category-Dimension	Factor I	$\underline{h}^2$
Self-Productive	.9008	.8115
Self-Active	.8559	.7327
Self-Flexible	.8202	.6728
Environment-Productive	.9219	.8499
Environment-Active	.8801	.7745
Environment-Flexible	.8706	.7579
Eigenvalue	4.5993	4.5993
%Variance	100.0	

TABLE III

CORRELATION COEFFICIENTS BETWEEN SCALED SCORES
OF THE WISC-R AND THE COPING INVENTORY*

	IN	SI	AR	VO	CM	DS	PC	PA	BD	OA	CD	SP**	SA	SF	EP	EA
SI	41***															
AR	30	33														
VO	47	49	31													
CM	42	48	35	69												
DS	34		27	33	22											
PC		28		27		21										
PA	21	31		30	20		37									
BD	22	29		24		20	34	39								
OA		25		23	20		38	22	50							
CD			25					23	21							
SP					20											
SA			21									77				
SF			20									83	70			
EP			20		22							82	77	75		
EA					23							75	78	68	83	
EF			20		25							75	75	67	83	81

*Decimals are omitted and only coefficients ≥.20 are included.

**Abbreviations: SP: Self-Productive; SA: Self-Active; SF: Self-Flexible;
EP: Environment-Productive; EA: Environment-Active;
EF: Environment-Flexible.

***Correlations ≥ .30 are underlined.

TABLE IV

WISC-R AND CI VARIMAX ROTATED FACTOR MATRIX*

Subtests	Factors I	II	III	IV	h^2
Information	.09228	.48196	.18353	.37153	.4125
Similarities	-.01416	.53801	.32695	.14485	.4175
Arithmetic	.17444	.35970	.19146	.24019	.2542
Vocabulary	.03555	.75939	.22927	.14782	.6524
Comprehension	.16195	.83650	.13464	-.02981	.7450
Digit Span	.01325	.25960	.17647	.44584	.2975
Picture Completion	.03871	.16402	.52353	.06731	.3070
Picture Arrangement	.06037	.17618	.48274	.10907	.2796
Block Design	-.00895	.07128	.71467	.11428	.5290
Object Assembly	-.07623	.13290	.63707	-.06873	.4341
Coding	.05142	.13273	.25526	.12702	.1016
Self-Productive	.89511	.05476	-.02333	.18043	.8373
Self-Active	.85377	.07874	.00817	-.02550	.7359
Self-Flexible	.81825	.02372	.00664	.24936	.7323
Environment-Productive	.91809	.06932	.01691	.00523	.8480
Environment-Active	.88428	.10171	.03460	-.10980	.8056
Environment-Flexible	.86519	.11996	.09329	-.03163	.7727
%Variance	54.2	31.8	9.8	4.2	
Cum. Variance	54.2	85.9	95.8	100.0	

*Significant loadings ($\geq$ .30) are underlined.

TABLE V

WISC-R: MEASURES OF CENTRAL TENDENCY

Subtest	Range	Mean	SD
Information	2-13	7.5	2.3
Similarities	4-14	9.0	2.0
Arithmetic	4-14	8.3	1.9
Vocabulary	4-16	9.6	2.4
Comprehension	4-17	10.7	2.3
Digit Span	2-13	6.9	2.1
Picture Completion	4-17	10.0	2.4
Picture Arrangement	4-15	10.1	2.1
Block Design	2-16	10.0	2.1
Object Assembly	6-16	11.0	2.0
Coding	3-15	8.3	2.7

TABLE VI

MEASURES OF CENTRAL TENDENCY
COPING INVENTORY

Subtests	Mean	SD
Self-Productive	3.26	.78
Self-Active	3.52	.73
Self-Flexible	3.14	.84
Self-Total	3.31	.72
Environment-Productive	3.50	.77
Environment-Active	3.36	.86
Environment-Flexible	3.27	.77
Environment-Total	3.37	.75
Adaptive Behavior Index	3.37	.71

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